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10/820,794	04/09/2004	Toshiaki Okuno	50395-267	8711

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EXAMINER	
CURS, NATHAN M	
ART UNIT	PAPER NUMBER
2613	
MAIL DATE	DELIVERY MODE
12/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/820,794	OKUNO, TOSHIAKI	
	Examiner	Art Unit	
	Nathan Curs	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7 and 9-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-7 and 9-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9 October 2007 has been entered.

Claim Objections

2. Claim 4 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 1 recites "an effective area of at most 50 μm^{2}" and claim 4 recites "an effective area of at most 60 μm^{2}". Since claim 1 already limits the effective area to a max of 50 μm^2, the 60 μm^2 limit of claim 4 does not further limit the max effective area.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 4, 6, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirloni et al. ("Tirloni") (US Patent Application Publication No. 2004/0028359) in view of Blez et al. ("Blez") (*High speed ultralow chirp 1.55 μm MBE grown GaInAs/AlGaInAs MQW DFB lasers*, Blez et al., Electronics Letters, Volume 28, Issue 11, 21 May 1992, Pages: 1040-1043).

Regarding claim 1, Tirloni discloses an optical transmission system, comprising: at least one optical fiber that: constitutes the principal portion of an optical transmission line at at least one repeater section and transmits a signal lightwave carrying at least one signal outputted by a light source (fig. 1, fiber A and repeater element 16 and paragraphs 0001, 0002, 0032 and 0064-0069, where section A, being the first fiber section of the repeater section, is the principal portion); has a chromatic dispersion that is negative at at least one wavelength of the signal lightwave and has a dispersion slope of at most 0.05 ps/nm^2/km in absolute value at the at least one wavelength and has an effective area of at most 50 μm^2 at the at least one wavelength (paragraphs 0120-0133, where fiber A is specifically type A10 and where the at least one wavelength is 1550 nm) and the signal lightwave has a wavelength band of not less than 40 nm (paragraph 0068). Tirloni discloses transmitting a DWDM lightwave covering C-band and L-band (paragraphs 0001, 0002 and 0135), and uses a 1550 nm wavelengths as a specification wavelength (paragraphs 0125-0133) but does not disclose a specific number of wavelengths for the lightwave. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to carry three or more signals, including one at 1550 nm, in the DWDM lightwave of Tirloni, since a DWDM lightwave that covers C-band and L-band, with a typical ITU standardized DWDM wavelength spacing of 100 GHz, can carry up to 150+ wavelengths. Also, Tirloni discloses a 1550 nm window WDM transmission system, but does not disclose directly modulated light sources. Blez discloses lasers for 1.55 μm window transmission, where the alpha parameter is at least 1.0 (page 1040, col. 2 to page 1041, col. 1, *Introduction* section and

page 1041, col. 2 to page 1042 col. 1, *Linewidth enhancement factor determination* and *Conclusion* sections). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the directly modulated lasers of Blez for the WDM system of Tirloni, to provide the benefit of good static, dynamic and spectral performance, as taught by Blez.

Regarding claim 3, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, wherein: (a) the at least one wavelength is one wavelength, the wavelength being about 1550 nm (Tirloni: paragraphs 0120-0133, where the at least one wavelength is 1550 nm); and (b) the at least one optical fiber has a zero-dispersion wavelength of at least 1610 nm (Tirloni: where the fiber specifications of paragraphs 0126-0128 indicate that the zero-dispersion wavelength is a wavelength greater than 1625 nm).

Regarding claim 4, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, wherein the at least one optical fiber has an effective area of at most 60 μm^2 at the at least one wavelength (Tirloni: paragraph 0130).

Regarding claim 6, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, wherein the at least one optical fiber has a chromatic dispersion of at least -16 ps/nm/km at the at least one wavelength (Tirloni: paragraph 0127).

Regarding claim 7, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, wherein the at least one optical fiber has a chromatic dispersion of at least -16 ps/nm/km and at most 0 ps/nm/km at all the wavelengths of the signal lightwave (Tirloni: paragraphs 0068, 0126-0128, where the fiber specifications of paragraphs 0126-0128 indicate negative dispersion for all wavelengths less than the upper end 1625 nm wavelength of the transmission band).

Regarding claim 9, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, wherein the at least one optical fiber has a non-linearity constant

γ at the at least one wavelength that is 1.87/Wkm (Tirloni: paragraph 0131) and a per-channel power P_{in} of the signal lightwave inputted into the at least one optical fiber of 1 dBm, for example (paragraph 0070, where 1 dBm equals 1.3 mW), which results in, for example, γP_{in} = 2.431/m, which reads on $\gamma P_{in} > 1.51 \times 10^{-6}$/m.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tirloni (US Patent Application Publication No. 2004/0028359) in view of Blez (*High speed ultralow chirp 1.55 μm MBE grown GaInAs/AlGaInAs MQW DFB lasers*, Blez et al., Electronics Letters, Volume 28, Issue 11, 21 May 1992, Pages: 1040-1043) as applied to claims 1, 3, 4, 6, 7 and 9 above, and further in view of Bickham et al. ("Bickham") (US Patent Application Publication No. 2004/0126074).

Regarding claim 5, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, wherein the at least one optical fiber as a cutoff wavelength of at most 1600 nm (Tirloni: paragraphs 0123-0125), but does not disclose that the cutoff wavelength is a 2-m cutoff wavelength measured on a 2-m length portion of the at least one optical fiber. Bickham discloses determining a cutoff wavelength spec for NZDSF fiber using the standard 2-m length measurement method (paragraphs 0003, 0047 and 0048). It would have been obvious to one of ordinary skill in the art at the time of the invention to derive the cutoff wavelength spec of Tirloni using the standard 2-m measurement test since the specification provide by a 2-m measurement test provides a normalized, realistic spectral response for the fiber close that is close to the theoretical cutoff for the fiber.

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tirloni (US Patent Application Publication No. 2004/0028359) in view of Blez (*High speed*

ultralow chirp 1.55 μm MBE grown GaInAs/AlGaInAs MQW DFB lasers, Blez et al., Electronics Letters, Volume 28, Issue 11, 21 May 1992, Pages: 1040-1043) as applied to claims 1, 3, 4, 6, 7 and 9 above, and further in view of Culverhouse et al. ("Culverhouse") (Culverhouse et al. *Corning® MetroCor™ Fiber and its Application in Metropolitan Networks* [online]. July 2000 [retrieved 2007-01-02]. Retrieved from the Internet <URL: http://www.corning.com/docs/opticalfiber/wp5078_7-00.pdf).

Regarding claim 10, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, but does not disclose a specific signal data rate of B Gb/s for the 1550 nm wavelength signal or a specific total accumulated dispersion for the system that is at least $-80{,}000/B^2$ ps/nm and at most 0 ps/nm at each wavelength. However, Tirloni discloses transmission over "long distances" (paragraph 0064), and negative dispersion for all the wavelengths in the transmission band of the fiber (paragraphs 0068 and 0126-0128). Culverhouse discloses 2.5 Gb/s data rates and repeater section lengths of at least 75km for a multiple-section WDM system using NZDSF fiber (page 1, col. 1, Abstract section and fig. 4 and page 3, col. 2 to page 4, col. 1, Experimental Results section). It would have been obvious to one of ordinary skill in the art at the time of the invention to use 2.5 Gb/s signals and a repeater section length of at least 75 km for the fiber of the WDM system already disclosed by the combination, since Culverhouse suggests that 2.5 Gb/s channel data rates and a length of at least 75 km are typical for WDM over NZDSF. Therefore, the combination of Tirloni and Blez, with a data rate of 2.5 Gb/s for the 1550 nm wavelength channel and a system fiber length of at least 75 km, the total accumulated dispersion for the system would be at least -322.5 ps/nm, which reads on at least $-80{,}000/(2.5)^2$ ps/nm (i.e. -12800 ps/nm) and at most 0 ps/nm at each wavelength.

Regarding claim 11, the combination of Tirloni and Blez discloses an optical transmission system as defined by claim 1, but does not disclose that the at least one repeater section has a length of at least 75 km. Culverhouse discloses repeater section lengths of at least 75km for a multiple-section WDM system using NZDSF fiber (fig. 4 and page 3, col. 2 to page 4, col. 1, Experimental Results section). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a repeater section length of at least 75 km for the WDM system already disclosed by the combination, since Culverhouse suggests that a repeater section fiber length of at least 75 km is typical for WDM over NZDSF.

7. Claims 1, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berkey et al. ("Berkey") (US Patent Application Publication No. 2002/0094179) in view of Blez (*High speed ultralow chirp 1.55 μm MBE grown GaInAs/AlGaInAs MQW DFB lasers*, Blez et al., Electronics Letters, Volume 28, Issue 11, 21 May 1992, Pages: 1040-1043).

Regarding claim 1, Berkey discloses an optical transmission system, comprising: at least one optical fiber that: constitutes the principal portion of an optical transmission line at at least one repeater section and transmits a signal lightwave carrying at least one signal outputted by a light source (paragraphs 0003 and 0010, where the fiber is disclosed in the context of WDM transmission with amplifiers, where light sources are inherent to the 1550 nm window wavelength channels of the WDM transmission); has a chromatic dispersion that is negative at at least one wavelength of the signal lightwave and has a dispersion slope of at most 0.05 $ps/nm^2/km$ in absolute value at the at least one wavelength (paragraph 0026, for the 1550 nm wavelength), has an effective area of less than 50 μm^2 at the at least one wavelength (paragraph 0036, applicable to the fig. 1 profile fiber, which is part of the profile "family"), and the signal lightwave has a wavelength band of not less than 40 nm (paragraph 0010). Berkey

discloses WDM transmission covering the 1480 - 1625 nm window (paragraph 0010) and discloses the 1550 nm wavelength as a specification wavelength (paragraph 0026), but does not disclose a specific number of wavelengths for the WDM system. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to carry three or more wavelengths, including the one at 1550 nm, in the WDM system of Berkey, since a WDM system that covers 1480 - 1625 nm transmission, considering a typical ITU standardized WDM wavelength spacing of 200 GHz, can carry up to 75+ wavelengths. Berkey also discloses WDM transmission in the 1550 nm window, but does not disclose directly modulated light sources. Blez discloses lasers for 1.55 μm window transmission, where the alpha parameter is at least 1.0 (page 1040, col. 2 to page 1041, col. 1, *Introduction* section and page 1041, col. 2 to page 1042 col. 1, *Linewidth enhancement factor determination* and *Conclusion* sections). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the directly modulated lasers of Blez for the WDM system of Berkey, to provide the benefit of good static, dynamic and spectral performance, as taught by Blez. Berkey also discloses that the fiber has an effective area of *less than* 50 μm^2 at the at least one wavelength, but does not disclose that the fiber has an effective area of *at most* 50 μm^2 at the at least one wavelength. However, based on Berkey's disclosure for effective area, it would have been obvious to one of ordinary skill in the art at the time of the invention for the effective area to be a value above 40 μm^2 and less than 50 μm^2, since Berkey discloses the lower limit of 40 μm^2. When a claimed ranges overlaps or lies inside a range disclosed by the prior art a prima facie case of obviousness exists (see MPEP § 2144.05).

Regarding claims 12 and 13, the combination of Berkey and Blez discloses an optical transmission system as defined by claim 1, wherein the at least one optical fiber has a

dispersion slope of at most 0.01 ps/nm^2/km in absolute value at the at least one wavelength (Berkey: paragraph 0026).

Response to Arguments

8. Applicant's arguments of 9 October 2007 have been considered but are not persuasive. The applicant argues in the remarks page 6 line 13 to page 7 line 3 that the combination of Tirloni and Blez and the combination of Berkey and Blez fail to "disclose or suggest" the limitation "... the signal lightwave carries at least three signals having a wavelength different from one another and has a wavelength band of not less than 40 nm". However, both Tirloni and Berkey do anticipate a wavelength band of not less than 40 nm, as cited above, and while Tirloni and Berkey don't explicitly anticipate a specific number of wavelengths (i.e. the claimed "three or more"), the three or more wavelengths are obvious for a DWDM or WDM system, as described in the rejections above addressing amended claim 1.

Conclusion

9. Any inquiry concerning this communication from the examiner should be directed to N. Curs whose telephone number is (571) 272-3028. The examiner can normally be reached on M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached at (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (800) 786-9199.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pairdirect.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NMC

12/25/2007

Nathan M. Curs